

# Fort Keogh Researcher

## Inside this issue:

Introduction	1
Building Design Progress	2
Research Update: Heifer Production on Range- land and Seeded Forages in the NGP	3
Award Recipient	5
Upcoming Events	5
Recent Publications	7

## Our Vision:

A world-renowned research program that provides knowledge relevant to efficiently producing nutritious and palatable beef from rangeland based livestock production systems.

## Our Mission:

To develop ecologically and economically sustainable range livestock production systems that meet consumers' expectations.

March 2005



## Introduction

*Dr. Rod Heitschmidt*  
*Research Leader*

Some of you may wonder why you have not seen a copy of the Fort Keogh Researcher since last March; at least in my mind, I hope some of you are asking that question. The reason is quite simple, we simply have not taken the time to write and publish our newsletter since last March, and for that, we apologize.

## Happenings

One of the more exciting things that has happened during the last 11 months is the completion and subsequent dedication of our new office/laboratory building additions. Primary construction of the 10,000 square foot additions was completed in late May followed by dedication on August 10. As you may recall, the additions consisted of 3 new research laboratories,

15 offices, a greenhouse, a conference center, and a reception area. These additions have greatly enhanced our ability to meet our research responsibilities as well as greatly improved our abilities to conduct effective technology transfer activities in cooperation with our many partners, particularly the Montana State University Extension Service.

We have also added several new members to our staff. New federal technicians include **Ms. Whisper Kelly** (Animal Nutrition), **Ms. Nina Lynch** (Rangeland Weed Ecology), and **Mr. Aaron Roth** (Rangeland Ecology). We also recently hired **Mr. Cody Molle** as the Montana Agricultural Experiment Station's Assistant to the Superintendent. In addition, the Montana State Extension Service Eastern Regional Department Head position was moved last spring from Bozeman to Fort



*Dr. Rod K. Heitschmidt*  
*Research Leader and*  
*Rangeland Ecologist*

Keogh with the position filled by former Fallon and Carter County Extension Agent, **Mr. Larry Brence**. Also, we had two recent retirements: **Mr. Larry French** (Molecular Genetics), after 8+ years of dedicated service, and **Mr. Jim Watts** (Ranch/Farm Hand), after 10+ years of dedicated service.

## Thoughts

A question I am often asked is – **Why should I believe Fort Keogh is important to me, per-**

*(Continued on page 2)*

(Continued from page 1)

**sonally?** Stated another way, the question is – **What does Fort Keogh do for me?**

There are 2 things I generally mention when answering this very legitimate and thoughtful question. **First and foremost**, I believe we can all agree that research and development is a key component to developing and maintaining any particular segment of American industry (i.e., automobile, space, agriculture, computer, etc.). and what is the largest industry in Montana – Is it not agriculture and is the

cow-calf industry not the largest segment of that industry? And, is Fort Keogh not a premier, world renown rangeland based, cow-calf research station? The answer to both of those questions is yes, and as such it should be obvious that Fort Keogh plays a key role in sustaining the economic viability of the Northern Great Plains as well as the cow-calf based rural economies across the United States.

**Second**, with approximately 50% of the United States' and world's lands classified as rangeland, it

seems imperative that we continue to improve our management of these lands for long-term sustainability. That is a major component of the Fort Keogh research program, and in this part of the world, that translates into working on improving the management of lots of lands as rangelands occupy considerably more than 50% of the land surface.

Can we do a better job? Certainly, and that is why we continue to solicit input from our many customers as to ways we can better meet their expectations. Come see us!

---

## Building News

The new additions were finished in May 2004 with a dedication ceremony held in August. The additions are now being fully utilized. Design work is now underway to update the older part of the building to make it as efficient and useful as the new additions.



# Heifer Production on Rangeland and Seeded Forages in the Northern Great Plains

Marshall Haferkamp  
Rangeland Scientist

Pastures seeded to perennial cool-season grasses may be used to reduce grazing pressure on native rangelands and provide quality forage for livestock during selected seasons. Seasonally, weight gains per head and per acre are often, but not always, greater on seeded pastures compared to native rangeland. Observed increases in animal performance often result from increases in both quantity and quality of available forage, and the potential high stocking rates used on seeded pastures. The variable animal responses that have been observed over both time (years) and space (sites) suggest research needs to be conducted within a variety of climate and vegetation types. To better understand responses in a Northern Great Plains environment, we compared performance of

yearling Line 1 Hereford heifers grazing seeded forages in spring and autumn to those grazing native rangelands at Fort Keogh.

## Materials and Methods

Twice replicated 7.4-acre seeded pastures of Rosana western wheatgrass, Luna pubescent wheatgrass, Hycrest crested wheatgrass, and a 1,300 acre pasture of native rangeland were grazed during spring 2000, 2001, and 2002; native rangeland was grazed during summer each year; and twice replicated 8-acre pastures of Alkar tall wheatgrass, Prairieland Altai wildrye, Bozoisky Russian wildrye, NewHy hybrid wheatgrass, and a 250 acre (2000) or 1,300 acre (2001 and 2002) pasture of native rangeland were grazed during autumn. Heifers were grazed with other cattle on native rangeland during the spring, summer, and autumn periods.

Seven heifers per replication grazed the spring pastures for 30 to 45 days from mid to late April through early June. Autumn pastures were grazed for 30 to 55 days beginning

in early September. Length of autumn grazing periods varied among years and forage species because of differences in available forage.

Forage production/availability were assessed by harvesting standing crop to ground level, immediately before and after each grazing event on seeded pastures and native rangeland. Selected sites on upland, lowland, and side slopes were sampled on native rangeland. Heifers were weighed at the beginning and end of each grazing period to calculate gains. Forage and diet quality were also determined during the study.

## Results and Discussion

Spring gains on native rangeland were generally lower than on seeded pastures (Tables 1 and 2). Spring gains of heifers were similar to previously reported gains of heifers (1.2 to 1.7 pounds/head/day and 64 pounds/acre) grazing spring grazing Hycrest, Luna, and Rosana here at LARRL.

Summer gains of heifers that grazed seeded pastures in the spring were somewhat less than those continuously grazing native rangeland (Tables 1 and 2). As forage quality declined on native rangeland throughout the summer, heifers that gained more rapidly in the spring may have a more difficult time obtaining an adequate amount of nutrients to maintain weight gain equal to that of the heifers that grew more slowly in the spring. In some conditions, late summer grazing has resulted in weight loss in yearling cattle on Northern Great Plains rangelands, but this has not occurred in years with more favorable growing conditions.

Improved gains on Prairieland and Bozoisky compared to native rangeland in the autumn (Tables 1 and 2) may be indicative of a viable management strategy for pregnant heifers going into winter. Strategies that in-

Table 1. Average daily gains of yearling heifer on seeded pastures and native rangeland at Miles City, MT.

Spring	Hycrest Crested wheatgrass	Luna Pubescent wheatgrass	Rosana Western wheatgrass	Native rangeland
----- (pounds/head/day) -----				
2000	2.09	2.22	1.68	0.55
2001	2.16	2.05	1.94	-0.13
2002	2.16	1.63	1.61	1.63

Summer on native rangeland				
	Hycrest	Luna	Rosana	Native rangeland
2000	0.77	0.93	0.66	1.43
2001	0.90	1.06	0.86	1.70
2002	1.08	1.21	1.19	1.21

Autumn	Alkar Tall wheatgrass	Prairieland Altai wildrye	Bozoisky Russian wildrye	Newhy Hybrid wheatgrass	Native rangeland
2000	-0.24	0.44	0.18	-0.24	-0.79
2001	1.21	1.96	1.81	1.72	1.04
2002	0.60	1.19	0.75	0.48	0.95

Table 2. Average gain per acre of yearling heifers grazing on seeded pastures and native rangeland at Miles City, MT.

Spring	Hycrest Crested wheatgrass	Luna Pubescent wheatgrass	Rosana Western wheatgrass	Native rangeland
----- (pounds/acre) -----				
2000	84.9	88.3	68.8	0.7
2001	57.2	54.1	51.4	-0.1
2002	75.2	57.1	56.2	2.0

Summer on native rangeland				
	Hycrest	Luna	Rosana	Native rangeland
2000	4.2	5.2	3.6	7.9
2001	5.9	6.8	5.6	11.0
2002	6.2	7.0	6.8	7.0

Autumn	Alkar Tall wheatgrass	Prairieland Altai wildrye	Bozoisky Russian wildrye	Newhy Hybrid wheatgrass	Native rangeland
2000	- 7.2	11.5	4.6	- 7.6	-9.9
2001	59.1	96.4	79.9	84.3	4.6
2002	30.4	60.9	24.1	25.2	1.6

crease weight and condition of pregnant cattle before winter may reduce winter feed requirements. The relative economic value of these seeded pastures compared to native rangeland and the impact on harvested feed needs were not evaluated in this study.

Spring gains followed a generalized pattern of forage quality among the seeded forages. Hycrest and Luna generally showed greater crude protein and digestibility in diet samples with correspondingly greater weight gain in heifers. Increased gains for heifers grazing Prairieland and Bozoisky in the autumn were also reflective of the increased dietary crude protein and digestibility for these forages.

Annual variation in amount and distribution of precipitation appears to explain some but not all of the variation in standing crop, forage and diet nutritive quality, and livestock performance. Above average precipitation in October and November 2000 and June and July 2001, potentially increased standing crops during summer and for some pastures during autumn 2001. The above average

precipitation in June and July 2001 also appeared to increase crude protein concentrations in forage, as well as crude protein and digestibility in diets through the summer of 2001 and at the turn-in date for some of the autumn pastures. The above average precipitation in May, August, and September 2002 did not appear to stimulate increases in standing crop or forage and diet nutritive quality except in a few cases.

Selecting suitable plant species for seasonal grazing is an important aspect of developing a viable integrated forage system. In an earlier study we discussed the problems with maintaining stands of pubescent wheatgrass in the 335-mm precipitation zone in the Northern Great Plains. The 4 forages that were grazed in autumn reportedly have very good to excellent salinity tolerance, are adapted to heavy textured soils, and are recommended for autumn grazing. However, findings from this study suggest that Bozoisky Russian wildrye is not as well adapted to high pH of Marias clay and silty clay soils as

the other cultivars evaluated. Also, use of Alkar tall wheatgrass during autumn does not take advantage of the pattern of forage production and nutritive quality of this grass. Much of the standing crop available to heifers in autumn was the stiff reproductive shoots produced during spring and early summer by this species. The low forage and diet quality for this species emphasize this fact.

## Management Implications

Seeded pastures of cool-season grasses provide livestock managers on western rangelands an opportunity to potentially increase available forage and provide quality forage for grazing livestock. Choosing the best forage for the intended use is critical. In this study Luna, Alkar, and Bozoisky were probably not the best adapted cultivars for the proposed use on these soils at this location.

Findings of this study and others clearly show that seasonal livestock gains may be better on seeded pastures than on native rangeland even with increased stocking pressure. Thus, seeded pastures can be an effective management tool that defers use of native rangeland. Results of this study suggest Hycrest crested wheatgrass would be the best among the cultivars evaluated for grazing in spring and Prairieland Altai wildrye would likewise be the most productive pasture for autumn. These findings, based on livestock performance, validate recommendations regarding use of complimentary forages based on their agronomic characteristics. However, early spring gains may not be maintained when cattle are moved from seeded pastures to native rangeland for the summer grazing season, and the increased gains may not occur every year. Livestock managers may need to modify their tactics to take full advantage of increased gains on seeded pastures.

# Society for Range Management Award Recipient

Presented at the 58th Annual Meeting, Fort Worth, Texas, January 2005

## Outstanding Young Range Professional



Dr. Lance Vermeire is a rangeland scientist at the USDA-ARS Fort Keogh Livestock and Range Research Laboratory located near Miles City, Montana. He is a native Sooner having been raised in Bartlesville, Oklahoma. He received his B.S. in wildlife ecology from Oklahoma State University in 1994, his M.S. in rangeland ecology from Oklahoma State University in 1997, and his Ph.D. in range science from Texas Tech University in 2002.

During his very short career, Dr. Vermeire has demonstrated an exceptional ability to identify important, researchable rangeland management problems, a keen ability to organize and conduct required research to address said problems, and an enviable ability to transfer new understandings to end users using superior written and verbal communication skills. Evidence in support of these conclusions is rendered by his publication record of 6 senior and 3 junior authored refereed journal articles plus numerous articles published in non-refereed publications such as Rangelands, field day reports, abstracts, and proceedings. He is also fast becoming a frequently requested technology transfer speaker in Montana and the surrounding region.

Dr. Vermeire has also played a significant role in the Society for Range Management by serving as Wildlife Habitat Committee Chair in 2001 and Newsletter Editor in 2004, Science Division Coordinator in 2002, Co-Organizer and Moderator of two science symposia in 2001 and 2002, and as a member of the Board of Directors of the Northern Great Plains Section from 2002 through 2004. For these reasons, Dr. Vermeire has been awarded the 2005 SRM Outstanding Young Range Professional Award.

## Upcoming Events:

- March 19, 2005—Excess Animal Sale -Call Sandi @ 406-874-8202 or Cody @ 406-874-8226 for more information.
- Week of May 2—School Tours
- September 30-October 1, 2005—Fort Keogh to Sponsor Bud Williams' Stockmanship School. Cost: \$425 per person. Lunch included both days. For more information, call Diona at 406-874-8219 or email at [diona@larri.ars.usda.gov](mailto:diona@larri.ars.usda.gov).

# Recent Publications

(for reprints email us at [reprint@larl.ars.usda.gov](mailto:reprint@larl.ars.usda.gov) or call Sue Miles at 406-874-8224)

Ahola, J.K., Baker, D.S., Burns, P.D., Mortimer, R.G., Enns, R.M., Whittier, J.C., **Geary, T.W.**, Engle, T.E. 2004. Effect Of Cu, Zn, and Mn Supplementation and Source on Reproduction, Mineral Status, and Performance In Grazing Beef Cattle Over a Two-Year Period. *Journal of Animal Science* 82:2375-2383.

Allen, V., **Heitschmidt, R.K.**, and Sollenberger, L. 2004. Grazing Systems and Strategies.. *Grazing Systems and Strategies*. IN: C. Jerry Nelson (Ed.) *Forages*, Vol. 11. Book Chapter.

Blummel, M., **Grings, E.E.**, and **Haferkamp, M.R.** 2004. Fermentation Profiles and Degradability Measurements In Extrusa Diet Samples Collected From Brome-Suppressed and Undisturbed Pastures and Their Relationship To Weight Gain Of Steers. *Canadian Journal Of Animal Science* 84 (1):105-111.

De, S., **MacNeil, M.D.**, Wu, X.L., Michal, L.L., Xiao, Q., Garcia, M.D., Griffin, K.B., Gaskins, C.T., Reeves, J.J., and Busboom, J.R. 2004. Detection Of Quantitative Trait Loci For Marbling and Backfat In Wagyu X Limousin F2 Crosses Using a Candidate Gene Approach. *Proceedings Western Section of Animal Science* 55:95-98.

Funston, R.N., Lipsey, R.J., **Geary, T.W.**, and Ansotegui, R.P. 2004. Evaluation of three estrous synchronization protocols in beef heifers. *The Professional Animal Scientist* 20:384-387.

**Grings, E.E.**, Short, R.E., and **Heitschmidt, R.K.** 2004. Post-Weaning Production Of Steers From Varying Calving and Weaning Strategies. *Proceedings Western Section of Animal Science* 55:126-129.

**Haferkamp, M.R.** and **MacNeil, M.D.** 2004. Annual Brome Seed Germination in the Northern Great Plains: An Update. *USDA Forest Service Proceedings RMRS-P-31*. P. 115-119.

**Heitschmidt, R.K.**, Klement, K.D., and **Haferkamp, M.R.** 2005. Interaction Effects of Drought and Grazing on Northern Great Plains Rangelands. *Rangeland Ecology and Management* 58:11-10.

**Heitschmidt, R.K.**, **Vermeire, L.T.**, and **Grings, E.E.** 2004. Is Rangeland Agriculture Sustainable?. *Journal of Animal Science* 82(E. Suppl.):E138-E146.

Kane, K.K., Hawkins, D.E., Pulsipher, G.D., Denniston, D.J., Krehbiel, C.R., Thomas, M.G., Petersen, M.K., Hallford, D.M., Remmenga, M.D., **Roberts, A.J.**, and Keisler, D.H. 2004. Effect of Increasing Levels of Undegradable Intake Protein on Metabolic and Endocrine Factors in Cycling Beef Heifers. *Journal Of Animal Science*. 82:283-291.

Kealey, C.G., **MacNeil, M.D.**, Tess, M.W., **Geary, T.W.**, and Bellows, R.A. 2004. Genetic Parameter Estimates for Yearling Scrotal Circumferences and Semen Traits of Line 1 Hereford

Bulls. *Western Section of Animal Science Proceedings* 55:36-39.

Kruse, R.E., Tess, M.W., **Grings, E.E.**, **Heitschmidt, R.K.**, Phillips, W.A., and Mayeux Jr, H.S. 2004. Evaluation of Beef Cattle Operations Utilizing Different Seasons of Calving, Weaning Strategies, Post-Weaning Management, and Retained Ownership. *Proceedings Western Section of Animal Science* 55:122-125.

Larson, J.E., Lamb, G.C., **Geary, T.W.**, Stevenson, J.S., Johnson, S.K., Day, M.L., Kesler, D.J., De-jarnette, J.M., Landblom, D.G., and Whittier, D. 2004. Estrus Synchronization of Replacement Beef Heifers By Using GnRh, Prostaglandin F2a(Pgf), and Progesterone (Cidr): A Multi-Location Study. *Kansas State Cattlemen's Day Proceeding / University of Minnesota Beef Cow/Calf Day Proceedings*. p. 3-6.

**MacNeil, M.D.** 2005. Beef Cattle Management: Extensive, p. 65-67. In: *Encyclopedia of Animal Science*. Marcel Dekker, Inc. New York. 800 pp. (Book Chapter).

**MacNeil, M.D.** 2004. Multiple Sire Mating: An Experimental Perspective. *Proceedings Beef Improvement Federation* p. 59-62. Available At: [www.beefimprovement.Org/Gpw-ProceedingsMay212004.Pdf](http://www.beefimprovement.Org/Gpw-ProceedingsMay212004.Pdf).

**MacNeil, M.D.** 2005. P. 612-614. In: *Mathematical Models: Production Systems*. *Encyclopedia of Animal Science*. Marcel Kekker, Inc. New York, New York.

**MacNeil, M.D., Cronin, M.A.** 2005. p. 609-311. In: Mathematical Models: Population Dynamics. Encyclopedia Of Animal Science. Marcel Dekker, Inc.

McAdoo, J.K., **Vermeire, L.T.**, and Gilgert, W. 2004. The Other Grazers. Rangelands. 26(3):30-37

Merrill, M.L., Ansotegui, R.P., Paterson, J., and **Geary, T.W.** 2004. Effect of Flunixin Meglumine on Early Embryonic Mortality in Stressed Beef Females. Proceedings Western Section Of Animal Science 55:204-207.

Olson, J.L., **Roberts, A.J.**, Ansotegui, R.P., Paterson, J.A., and Funston, R.N. 2004. Efficacy of an Intravaginal Progesterone Insert and an Injection of Pgf<sub>2a</sub> To Advance Date Of Breeding In Postpartum Beef Cows while Utilizing Natural Service. Proceedings Western Section of Animal Science 55:11-14.

Perry Jr, G.A., Smith, M.F., **Geary, T.W.** 2004. Ability of Intravaginal Progesterone and Melengestrol

Acetate to Induce Estrous Cycling Status in Postpartum Beef Cows. Journal Of Animal Science 82(3):695-704.

**Reisenauer, V.L. and MacNeil, M.D.** 2004. Sas® Tools to Facilitate QTL Discovery1. Proceedings Western Section Of Animal Science 55:126-129.

Rogers, P.L., Gaskins, C.T., Johnson, K.A., and **MacNeil, M.D.** 2004. Evaluating Longevity of Composite Beef Females Using Survival Analysis Techniques. Journal of Animal Science 82:860-866.

Sutovsky, P., **Geary, T.W.**, Baska, K., Manandahar, G., Feng, D., Lovercamp, K.W., Sutovsky, M. 2004. Ubiquitin as an Objective Marker of Semen Quality and Fertility in Bulls. Proceedings Nebraska Applied Reproductive Strategies in Beef Cattle Symposium.

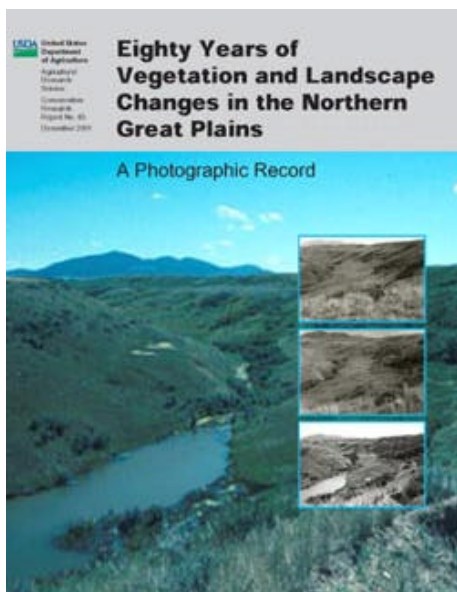
Turzillo, A.M., Moore, H.C., Rajapaksa, K.S., Greer, K.A., Hoying, J.B., Collier, R.J., and

**Roberts, A.J.** 2004. Gene Expression Profiling in Pituitary Glands Of Cows During The Preovulatory Period using Bovine Specific Cdna Microarrays. Proceedings Society Study of Reproduction Annual Meeting 54:251-253.

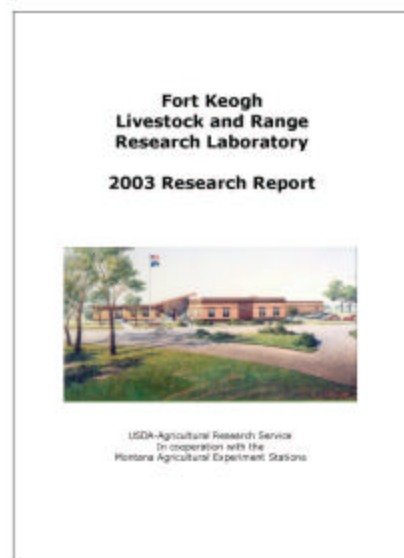
**Vermeire, L.T., Heitschmidt, R.K., Johnson, P.S., and Sowell, B.F.** 2004. The Prairie Dog Story: Do We Have It Right?. Bioscience 54(7):689-695.

**Vermeire, Lance T., Wallace, Mark C., and Mitchell, Robert B.** 2004. Elk populations in the Western United States and Canadian Provinces. Rangelands 26 (5):29-33.

Walker, R.S., Enns, R.M., **Geary, T.W.**, Wamsley, N.W., Downing, E.R., Mortimer, R.G., Lashell, B.A., and Zalesky, D.D. 2004. Fertility In Beef Heifers Synchronized Using A Modified Co-Synch Plus Cidr Protocol With Or Without GnRh At Timed Ai. Proceedings Western Section Of Animal Science 55:3-6.



There are still copies of the 2003 Research Report and Eighty Years of Vegetation and Landscape Changes in the Northern Great Plains available. If you didn't receive a copy and would like one, call 406-874-8219 or email us at (reprint@larl.ars.usda.gov) and we will be glad to send you one.



USDA-ARS Fort Keogh  
Livestock and Range  
Research Laboratory  
In cooperation with  
Montana Agricultural  
Experiment Stations

*243 Fort Keogh Road*

*Miles City, MT 59301-4016*

*Phone: 406-~~874-8200~~—New prefix*

*Fax: 406-~~874-8289~~—New Fax #*



Web Address!

[www.ars.usda.gov/npa/ftkeogh](http://www.ars.usda.gov/npa/ftkeogh)

Feel free to pass on this issue of the Fort Keogh Researcher to others interested in agriculture and agricultural research.

To be added to our mailing list, request a copy through our website or contact Diona Austill by phone (406-874-8219), fax (406-874-8289), or email ([diona@larri.ars.usda.gov](mailto:diona@larri.ars.usda.gov))

Fort Keogh to Sponsor  
Bud Williams' Stockmanship School

September 30—October 1, 2005

Cost: \$425 per person  
Lunch included both days.

For more information,  
call Diona at 406-874-8219 or  
email at [diona@larri.ars.usda.gov](mailto:diona@larri.ars.usda.gov).